

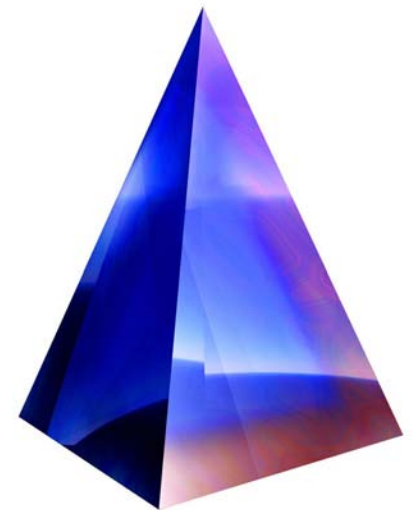


AmerenUE Critical Peak Pricing Pilot

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Situation Overview

- AmerenUE, in conjunction with a Missouri Collaborative formed as the result of a rate case settlement, launched a Residential Time-Of-Use (“RTOU”) Pilot study in the Spring of 2004
- Two innovative rate offerings:
 - Three tier time-of-use rate with high differentials
 - Three tier time-of-use rate with high differentials subject to a critical peak pricing (“CPP”) element
 - Three tier time-of-use rate with high differentials subject to a critical peak pricing (“CPP”) element and enabling technology, a “smart thermostat”, that automatically increased customers thermostat settings during critical peak pricing events

Project Objective(s) – Year 1

- **Purpose:** Obtain information needed to determine if and how residential time-of-use rates will be beneficial in Missouri.
- **Report Goals and Analysis:**
 - Evaluating the pros/cons and cost effectiveness¹ of three TOU program designs including:
 - TOU with three rate levels;
 - TOU with three rate levels and a critical peak pricing component; and
 - TOU with three rate levels, a critical peak pricing component and enabling technology in the form of a “smart” thermostat.
 - Estimate the demand reduction occurring at the AmerenUE system peak;
 - Determine the magnitude of the load shifted between on-peak and off-peak periods;
 - Estimate the impact, if any, of the energy conservation as a result of this pilot
 - Estimate the load reduced during the critical peak pricing periods;
 - Determine the amount of load “payback” that occurs immediately following the critical peak pricing periods

Project Objective(s) – Year 2

- **Purpose:** Obtain information needed to determine if and how residential time-of-use rates will be beneficial in Missouri.

- **Report Goals and Analysis:**

The primary goals of the 2005 Residential TOU Pilot Study analysis are as follows:

- Confirm that the time-of-use with critical peak pricing (CPP) rate and CPP rate coupled with enabling technology caused a statistically significant change in customers' energy use during periods of potentially high prices;
- Confirm the magnitude of load reduction during on-peak and CPP periods and the amount of energy shift from on-peak to mid-peak or off-peak periods;
- Examine whether or not a second year of participation increases the customer's ability to shift load during CPP events or from the on-peak to mid-peak or off-peak periods;
- Confirm that CPP and/or CPP with enabling technology increases customer awareness and produces positive results in conservation, i.e., reductions in total consumption; and
- Examine the cost-effectiveness of this type of programs.

Pilot Structure

- *Three Treatment Groups were formed to match the three rate structures*
- *Three **Control** Groups were formed to match the three rate structures*
- *High Summer Residential Customers Were Targeted*

Technology Selected

- **Figure 1 – Cannon/Honeywell ExpressStat**
- **The Cannon/Honeywell thermostat is capable of precise temperature control with four time and temperature settings per day. The thermostat has the capacity to handle weekday, Saturday and Sunday schedules.**



Figure 1 – Cannon/Honeywell ExpressStat

Residential TOU/CPP Rate Design

Summer: Three-Tier TOU Only

	<u>Rate</u>
Off Peak (Weekday 10PM–10AM, Weekends, Holidays)	4.80 cents/kWh
Mid Peak (Weekdays 10AM– 3PM and 7PM-10PM)	7.50 cents/kWh
Peak (Weekday 3PM – 7PM)	18.31 cents/kWh

Summer: Three-Tier TOU with CPP

	<u>Rate</u>
Off Peak (Weekday 10PM–10AM, Weekends, Holidays)	4.80 cents/kWh
Mid Peak (Weekdays 10AM– 3PM and 7PM-10PM)	7.50 cents/kWh
Peak (Weekday 3PM – 7PM)	16.75 cents/kWh
CPP (Weekday 3PM – 7PM, 10 times per summer)	30.00 cents/kWh

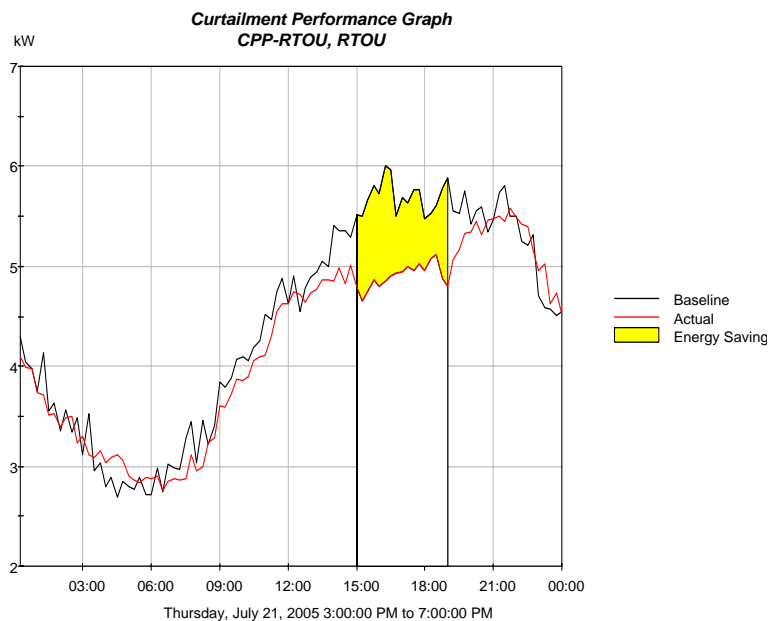
Customer Recruitment

AmerenUE provided the recruitment vendor a file of customers to target for conversion to the TOU service. The main selling propositions were:

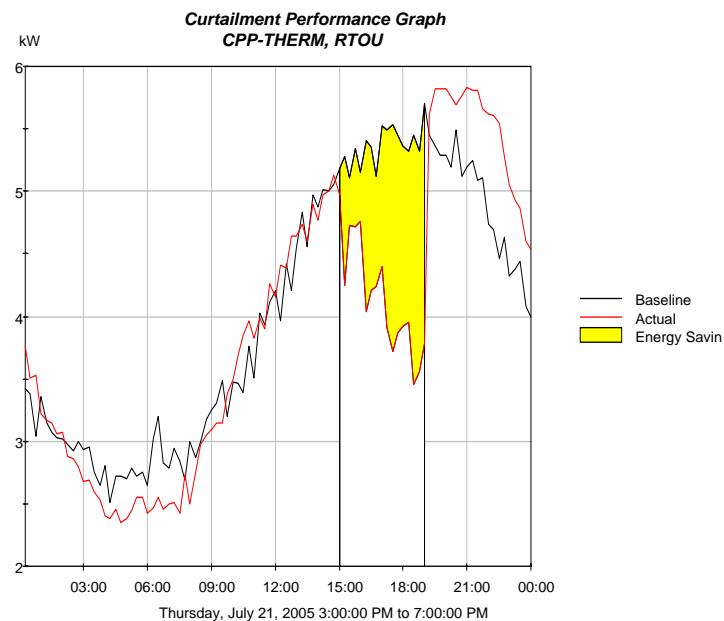
- Potential savings may be realized by reducing electricity usage in response to higher prices during peak hours. Additionally, the shifting of electric usage patterns to day parts when electric costs will be at lower rates will result in savings. (Similar to long distance phone usage plans.)
- Most customers should recognize savings with more efficient use of electricity; however, in the event they are not able to take advantage of favorable off-peak rates, their bill may increase.
- There are no forms/or steps to convert, just confirm they would like to participate in the Pilot and the billing change will be automatic.
- In the event they want to opt out of participating in the future, they can change back to their former rate application.
- For those that qualify for the research, based primarily on the ability of Ameren to read their meters remotely, **a sign on incentive of \$25 will be offered and an additional \$75 dollars will be provided to those that maintain their participation in the Pilot for at least six months.**

Results -Typical Impact On CPP Event Day

CPP Event Day
July 21, 2005



CPP Event Day
July 21, 2005



**The “CPP Only” group reduced demand by 0.63 kW per participant.
The “CPP W/Smart Thermostat” group reduced demand by 1.36 kW.**

Results – CPP Event Day Comparisons

Three Tier TOU with CPP (CPP)									
CPP Event			Control Group (kW)	RTOU Pilot Group (kW)	Difference Control-RTOU (kW)	Percent Difference (%)			
Date	Hour Ending						T-Test	Pr> t	Ho: Control=RTOU
	Start	End							
30-Jun-05	3:00 PM	6:59 PM	5.35	4.85	0.50	9.3%	2.63	0.0088	Reject
21-Jul-05	3:00 PM	6:59 PM	5.71	4.91	0.80	14.1%	3.75	0.0002	Reject
22-Jul-05	3:00 PM	6:59 PM	5.84	5.05	0.79	13.5%	3.54	0.0005	Reject
26-Jul-05	3:00 PM	6:59 PM	5.98	4.91	1.06	17.8%	5.28	0.0000	Reject
2-Aug-05	3:00 PM	6:59 PM	5.38	4.73	0.65	12.1%	3.24	0.0013	Reject
9-Aug-05	3:00 PM	6:59 PM	5.64	4.74	0.90	16.0%	4.33	0.0000	Reject
10-Aug-05	3:00 PM	6:59 PM	5.01	4.24	0.76	15.2%	4.00	0.0000	Reject
19-Aug-05	3:00 PM	6:59 PM	5.61	4.88	0.74	13.1%	3.54	0.0004	Reject
Average			5.56	4.84	0.72	13.0%	3.90	0.0001	Reject
Three Tier TOU with CPP and Thermostat (CPP-THERM)									
CPP Event			Control Group (kW)	RTOU Group (kW)	Difference Control-RTOU (kW)	Percent Difference (%)			
Date	Hour Ending						T-Test	Pr> t	Ho: Control=RTOU
	Start	End							
30-Jun-05	3:00 PM	6:59 PM	5.02	4.30	0.72	14.4%	2.93	0.0036	Reject
21-Jul-05	3:00 PM	6:59 PM	5.37	4.09	1.27	23.7%	5.22	0.0001	Reject
22-Jul-05	3:00 PM	6:59 PM	5.38	4.18	1.20	22.4%	5.39	0.0001	Reject
26-Jul-05	3:00 PM	6:59 PM	5.56	4.38	1.18	21.2%	4.93	0.0001	Reject
2-Aug-05	3:00 PM	6:59 PM	5.23	3.66	1.57	30.0%	6.30	0.0001	Reject
9-Aug-05	3:00 PM	6:59 PM	5.47	4.01	1.46	26.7%	5.76	0.0001	Reject
10-Aug-05	3:00 PM	6:59 PM	4.95	3.82	1.13	22.8%	4.95	0.0001	Reject
19-Aug-05	3:00 PM	6:59 PM	5.38	3.97	1.41	26.1%	5.49	0.0001	Reject
Average			5.29	4.05	1.24	23.5%	6.05	0.0001	Reject

Results – TOU Energy Comparisons

Three Tier TOU with CPP (CPP)						
Jun 1 - Aug 31 TOU Period	Control Group (kWh)	RTOU Group (kWh)	Difference Control-RTOU (kWh)			
				T-Test	Pr> t	Ho: Control=RTOU
Seasonal Use	7,729	7,584	145.00	0.58	0.56	Cannot Reject
Off-Peak Use	4,495	4,450	45.00	0.28	0.78	Cannot Reject
Mid-Peak Use	2,054	2,019	35.00	0.54	0.59	Cannot Reject
On-Peak Use	927	896	31.00	0.96	0.34	Cannot Reject
CPP Use	252	219	33.10	3.92	0.00	Reject
Percent Off-Peak	58.2%	58.7%	-0.5%	1.02	0.31	Cannot Reject
Percent Mid-Peak	26.6%	26.6%	0.0%	0.15	0.88	Cannot Reject
Percent On-Peak	12.0%	11.8%	0.2%	(0.72)	0.47	Cannot Reject
Per CPP	3.3%	2.9%	0.4%	4.08	0.00	Reject
Three Tier TOU with CPP and Thermostat (CPP-THERM)						
Jun 1 - Aug 31 TOU Period	Control Group (kWh)	RTOU Group (kWh)	Difference Control-RTOU (kWh)			
				T-Test	Pr> t	Ho: Control=RTOU
Seasonal Use	7,205	6,963	242	0.98	0.33	Cannot Reject
Off-Peak Use	4,147	4,017	130	0.91	0.37	Cannot Reject
Mid-Peak Use	1,934	1,901	33	0.46	0.65	Cannot Reject
On-Peak Use	884	863	21	0.64	0.52	Cannot Reject
CPP Use	240	182	58	5.99	0.00	Reject
Percent Off-Peak	57.6%	57.7%	-0.1%	0.26	0.79	Cannot Reject
Percent Mid-Peak	26.8%	27.3%	-0.5%	1.36	0.18	Cannot Reject
Percent On-Peak	12.3%	12.4%	-0.1%	0.49	0.63	Cannot Reject
Per CPP	3.3%	2.6%	0.7%	(8.18)	0.00	Reject

General Conclusions

- The critical peak pricing component of the time-of-use rate does motivate customers to reduce demand during most of the CPP events, but does not appear effective in motivating customers to shift a statistically significant amount of load from the on-peak to off-peak or mid-peak periods.
- The enabling technology was a key component of the offering with the groups receiving the “smart” thermostat displaying much stronger load response (more than double) during CPP events when compared to the CPP only group.
- In general the groups did not display a statistically significant shift in load between the on-peak to off-peak or mid- peak periods. For both test groups, there was a slight increase in the percentage of off-peak energy use and a corresponding decrease in on-peak energy use.
- There was insufficient evidence to conclude that the second year participants improved their load reductions in the second year when compared to their first year of participation.
- **First-year control group participants that were moved to the pilot groups in 2005 confirmed that CPP rate is effective in reducing demand. Both new CPP only and CPP-Thermostat groups reduced a statistically significant amount of load during the CPP periods when they received the CPP rates.**

WHERE DOES AMERENUE GO FROM HERE?

- The Residential TOU pilot showed promise in its ability to heighten awareness of energy consumption, and potentially change behavior:
 - Clearly focus group participants are more aware of and more sensitized to their energy consumption patterns today than they were prior to becoming involved in the test.
 - The resulting increased consciousness translated to some change in behavior for almost all of the focus group participants
 - The idea of being “in control” appealed to most participants

WHERE DOES AMERENUE GO FROM HERE?

- Begin benefit/cost analysis on both CPP and CPP/w Smart Thermostat options
- Assuming benefit/cost ratio > 1.0 , phase in full scale program

R.A. Voytas Bio

Richard A. Voytas is Manager – Corporate Analysis in the Corporate Planning Department at Ameren Services in St. Louis, MO. He is responsible for long-term resource planning, load analysis, and economic evaluation of emission allowance strategies. Included in resource planning is work relative to the analysis of demand response, energy efficiency and renewable energy options to meet customer load growth.

Mr. Voytas serves on the NERC Resource Issues Subcommittee, the AEIC Load Research Committee, and the U.S. Demand Response Coordinating Committee.

Mr. Voytas has been with Ameren for 31 years in positions ranging from Plant Engineer to Fuel Buyer to Rate Engineer to Corporate Analysis. He has a B.S. in Mechanical Engineering from the University of MO-Rolla and a MBA from St. Louis University. He is also a registered professional engineer.